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PHILOSOPHICAL TRANSACTIONS.

Munday December 17. 1666.

The Contents.

The Method observed in Transfusing the Blood out of one live Animal into another: And how this Experiment is like to be improved. Some Considerations concerning the same. An Account of some Sanative Waters in Herefordshire. A farther Account of the Vitriolate Water mention'd Numb. 18. together with some other particulars touching Waters. Inquiries for Turkey. An Observation about Optick Glasses made of Rock-Crystal, communicated from Italy. A Relation of the Use of the Grain of Kermes for Coloration, from France. An Account of some Books lately publisht, vid. 1. PINAX Rerum Naturalium BRITANNICARUM, continens VEGETABILIA, ANIMALIA & Fossilia ANGLIÆ, inchoatus; Auth. Christophoro Merret, M. D. 2. PLACITA PHILOSOPHICA Guarini. 3. GUSTUS ORGANUM per Laurentium Bellini deprehensum.

The Method observed in Transfusing the Blood out of one Animal into another.

THIS Method was promised in the last of these Papers. It was first practis'd by Doctor Lower in Oxford, and by him communicated to the Honourable Robert Boyle, who imparted it to the Royal Society, as follows;

First, Take up the Carotidal Artery of the Dog or other Animal, whose Blood is to be transfused into another of the

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same or a different kind, and separate it from the Nerve of the *Eight pair*, and lay it bare above an inch. Then make a strong Ligature on the *upper* part of the Artery, not to be untied again: but an inch below, *vide!* towards the Heart, make another Ligature of a *running* knot, which may be loosen'd or fastened as there shall be occasion. Having made these two knots, draw two threds under the Artery between the two Ligatures; and then open the Artery, and put in a Quill, and tie the Artery upon the Quill very fast by those two threds, and stop the Quill with a stick. After this, make bare the *Jugular* Vein in the other Dog about an inch and a half long; and at each end make a Ligature with a running knot, and in the space betwixt the two running knots draw under the Vein two threds, as in the other: then make an Incision in the Vein, and put into it two Quills, one into the *descendent* part of the Vein, to receive the blood from the other Dog, and carry it to the Heart; and the other Quill put into the other part of the *Jugular* Vein, which comes from the Head (out of which, the second Dogs own blood must run into Dishes.) These two Quills being put in and tyed fast, stop them with a stick, till there be occasion to open them.

All things being thus prepar'd, tie the Dogs on their sides towards one another so conveniently, that the Quill may go into each other, (for the Dogs necks cannot be brought so near, but that you must put two or three several Quills more into the first two, to convey the blood from one to another.) After that, unstop the Quill that goes down into the first Dog's *Jugular* Vein, and the other Quill coming out of the other Dog's Artery; and by the help of two or three other Quills, put into each other, according as there shall be occasion, insert them into one another. Then slip the running knots, and immediately the blood runs through the Quills, as through an Artery, very impetuously. And immediately, as the blood runs into the Dog, unstop the other Quill, coming out of the *upper* part of his *Jugular* Vein (a Ligature being first made about his Neck, or else his other *Jugular* Vein being compress'd by ones Finger;) and let his own blood run out at the same time into Dishes (yet not constantly, but according as you perceive him able to bear it) till

till the other Dog begin to cry, and faint, and fall into Convulsions, and at last dye by his side.

Then take out both the Quills out of the Dogs *Jugular Vein*, and tye the running knot fast, and cut the Vein asunder, (which you may doe without any harm to the Dog, one *Jugular Vein* being sufficient to convey all the blood from the Head and upper parts, by reason of a large *Anastomosis*, whereby both the *Jugular Veins* meet about the *Larynx*.) This done, sow up the skin and dis-miss him, and the Dog will leap from the Table and shake himself, and run away, as if nothing ailed him.

And this I have tryed several times, before several in the *Universities*, but never yet upon more than one Dog at a time, for want of leisure, and convenient supplies of several Dogs at once. But when I return, I doubt not but to give you a fuller account, not only by bleeding several Dogs into one, but several other creatures into one another, as you did propose to me, before you left *Oxford*; which will be very easie to perform; and will afford many pleasant and perhaps not unuseful Experiments.

But because there are many Circumstances necessary to be observ'd in the performing of this experiment, and that you may better direct any one to doe it, without any danger of killing the other Dog, that is to receive the others blood, I will mention two or three.

First, that you fasten the Dogs at such a convenient distance, that the Vein nor Artery be not stretched; for then, being contracted, they will not admit or convey so much blood.

Secondly, that you constantly observe the Pulse beyond the Quill in the Dogs *Jugular Vein* (which it acquires from the impulse of the *Arterious* blood:) For if that fails, then 'tis a sign the Quill is stopt by some congealed blood, so that you must draw out the *Arterial* Quill from the other, and with a *Probe* open the passage again in both of them, that the blood may have its free course again. For, this must be expected, when the Dog, that bleeds into the other, hath lost much blood, his heart will beat very faintly, and then the impulse

of bloud being weaker, it will be apt to congeal the sooner, so that at the latter end of the work you must draw out the Quill ofter, and clear the passage; if the Dog be faint-hearted, as many are, though some stout fierce Dogs will bleed freely and uninterruptedly, till they are convuls'd and dyē. But to prevent this trouble, and make the experiment certain, you must bleed a great Dog into a little one, or a *Mastive* into a *Curr*, as I once try'd, and the little Dod bled out at least double the quantity of his own bloud, and left the *Mastive* dead upon the Table, and after he was untied, he ran away and shak'd himself, as if he had been only thrown into water. Or else you may get three or four several Dogs prepared in the same manner; and when one begins to fail and leave off bleeding, administer another, and I am confident one Dog will receive all their bloud, (and perhaps more) as long as it runs freely, till they are left almost dead by turns: provided that you let out the bloud proportionably, as you let it goe into the Dog, that is to live.

Thirdly, I suppose the Dog that is to bleed out into dishes will endure it the better, if the Dogs that are to be administered to supply his bloud, be of neer an equal age, and fed alike the day before, that both their bloods may be of a neer strength and temper.

There are many things I have observed upon bleeding Dogs to death, which I have seen since your departure from *Oxford*, whereof I shall give you a relation hereafter; in the mean time since you were pleas'd to mention it to the *Royal Society*, with a promise to give them an account of this experiment, I could not but take the first opportunity to clear you from that obligation, &c.

So far this Letter: the prescriptions whereof having been carefully observ'd by those who were employ'd to make the Experiment, have hitherto been attended with good success; and that not only upon Animals of the same *Species* (as two Dogs first, and then two Sheep) but also upon some of very differing *Species* (as a Sheep and a Dog; the former *Emitting*, the other *Receiving*.)

Note only, that in stead of a Quill, a small crooked thin Pipe

Pipe of Silver or Brass, so slender that the one end may enter into a Quill, and having at the other end, that is to enter into the Vein and Artery, a small knob, for the better fastening them to it with a thread, will be much fitter than a strait Pipe or Quill, for this Operation: for so they are much more easie to be managed.

'Tis intended, that these tryals shall be prosecuted to the utmost variety the subject will beare: As by exchanging the blood of Old and Young, Sick and Healthy, Hot and Cold, Fierce and Fearful, Lame and Wild Animals, &c. and that not only of the same, but also of differing kinds. For which end, and to improve this noble Experiment, either for knowledge, or use, or both, some Ingenious men have already proposed considerable tryals and inquiries; of which perhaps an account will be given hereafter. For the present we shall only subjoyn some

Considerations about this kind of Experiments.

1. It may be consider'd in them, that the blood of the *Emit-tent* Animal, may after a few minutes of time, by its circulation, mix and run out with that of the *Recipient*. Wherefore to be assured in these Tryals, that all the blood of the *Recipient* is run out, and none left in him but the adventitious blood of the *Emit-tent*, two or three or more Animals (which was also hinted in the *method* above) may be prepared and administered, to bleed them all out into one.

2. It seems not irrational to guess afore hand, that the exchange of blood will not alter the nature or disposition of the Animals, upon which it shall be practised; though it may be thought worth while for satisfaction and certainty, to determine that point by Experiments. The case of exchanging the blood of Animals seems not like that of *Grafting*, where the *Cyons* turns the Sap of the *Stock*, grafted upon, into its nature; the *Fibres* of the *Cyons* for straining the juice, which passes from the stem to it, as thereby to change it into that of the *Cyons*, whereas in this transfusion there seems to be no such
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Percolation of the blood of Animals, whereby that of the one should be changed into the nature of the other.

3. The most probable use of this Experiment may be conjectured to be, that one Animal may live with the blood of another ; and consequently , that those Animals, that want blood, or have corrupt blood, may be supplied from others with a sufficient quantity, and of such as is good, provided the Transfusion be often repeated, by reason of the quick expence that is made of the blood.

Note.

In the last Transactions was also promised an Account by the next, of Monsieur Hevelius his accurate Calcul. of the late Solar Eclipses, Duration, Quantity, &c. But this being to be accompanied with a Scheme, the Graving whereof met with a disappointment, it must be still referred to another Opportunity.

An account of some Sanative Waters in Herefordshire.

This account was communicated by Dr. B. in these words.

There are two Springs in *Herefordshire*, whereof one is within a Bolt, or at least Bow-shoot of the top of the near adjoining lofty Hill of *Malvern*, and at great distance from the Foot of the Hill ; and hath had a long and old fame for healing of eyes. When I was for some years molested with Teters on the back of one and sometimes of both my hands, notwithstanding all indeavours of my very friendly and skilful Physicians, I had speedy healing from a neighbouring Spring of far less fame. Yet this Spring healed very old and Ulcerous sores on the Legs of a poor Fellow, which had been poyson'd by Irons in the Gaol, after other Chirurgery had been hopeless. And by many tryals upon my hands, and the Teters, I was perswaded, that in long droughts, and lasting dry Frosts, those waters were more effectually and more speedily healing, than at other times. And not to omit this circumstance, I did hold this water in my mouth till it was warm, and perchance somewhat intermingled with fasting Spittle,
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